Better living with illness

Better Living with Illness:

A Transdiagnostic Acceptance and Commitment Therapy Group Intervention for Chronic Physical Illness

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Running title: Transdiagnostic Acceptance and Commitment Therapy for physical illness.

Abstract

Background: Long term conditions are on the rise and are associated with increased risk of psychological problems. Commonalities across long term conditions suggests a transdiagnostic psychological intervention may be beneficial. An Acceptance and Commitment Therapy (ACT) group intervention was evaluated for people with long term physical health conditions.

Methods: Participants with long term physical health conditions were invited to an ACT group (n=53). Measures were completed at assessment, pre, post and 3-month follow-up. These assessed anxiety and depression symptoms, health perceptions, values-based living and psychological flexibility. Period from assessment to pre intervention served as a within-participant control.

Results: Depression and anxiety symptoms reduced significantly from pre to post, compared to control period. Significant improvements were found in values-based living and psychological flexibility. These changes were in the context of non-significant changes in health perceptions.

Conclusions: Group-based ACT interventions may be beneficial for long term physical conditions and can be delivered transdiagnostically.

Introduction

Long term physical conditions (LTC) are a significant challenge for healthcare systems (Naylor *et al.*, 2012). Defined as those that require "ongoing management over a number of years or decades" (WHO, 2002, p. 11), there is widespread acknowledgement that the personal impact of LTC is greater than the physical symptoms alone (NHS Confederation, 2012). Individual experiences can vary, with some conditions being relatively stable (e.g. chronic low back pain) and others being progressive, such as multiple sclerosis, Alzheimer's Disease or arthritis. Despite these differences, many people with LTC share common challenges, such as living with daily pain (DoH, 2012a) and difficulties performing everyday tasks (Hoffman, Rice & Sung, 1996). People with LTC are two to three times more likely to develop psychological problems such as depression, compared to the general population (Moussavi, Chatterji & Verdes, 2007).

Traditional medical interventions aim to reduce and manage physical symptoms and enhance quality of life in LTC (Grumbach, 2003), but psychological interventions are increasingly playing an important role in the broader care of this population. Growing evidence suggests that psychological interventions such as cognitive behavioural therapy (CBT) can moderate the psychological impact of LTC across a range of conditions, such as multiple sclerosis (Mohr *et al.*, 2001), human immunodeficiency virus (HIV; Markowitz *et al.*, 1998), kidney disease (Duarte *et al.*, 2009) and chronic obstructive pulmonary disease (Hynninen *et al.*, 2001). The benefits of these interventions may not only be psychological: physical improvements in LTC, such as better glycemic control in diabetes (Alam *et al.*, 2009) and reductions in pain (Vowles & McCracken, 2008) have also been reported following psychological intervention.

Much of this evidence is for single diagnoses, with each trial evaluating an intervention for an individual LTC. This diagnosis-specific approach, drawing on the medical model that underpins much of physical healthcare, is common in psychological intervention research (Taylor & Clark, 2009), with protocols often designed for specific psychiatric diagnosis populations such as panic disorder, unipolar depression or posttraumatic stress disorder (Butler, Chapman, Forman, & Beck, 2006). This approach has been criticised, however, and much of the critique is also relevant to psychological interventions in physical health settings (Mansell *et al.* 2009). For example, one important challenge for psychological research, in both mental health and chronic illness settings, is comorbidity. More than half of those living with LTC have more than one condition, and this is set to rise (Barnett *et al.*, 2012; Trento *et al.* 2012), yet the majority of research excludes participants with comorbid conditions (McManus *et al.*, 2010). Dissemination also presents a significant challenge to this approach, with therapists requiring training in many protocols in order to deliver evidence-based services (Taylor & Clark, 2009). Clearly, these challenges make it difficult to translate research to clinical populations (Barlow *et al.*, 2004).

Some researchers have responded by advocating a transdiagnostic or unified approach to psychological interventions (Barlow *et al.*, 2004). Research linking emotion regulation processes such as rumination and avoidance to a wide range of psychiatric diagnoses (McLaughlin & Nolen-Hoeksema, 2012; Aldao, Nolen-Hoeksema & Schweizer, 2010) has led some to suggest therapies could be used across diagnoses with minimal adaptations (Taylor & Clark, 2009). Transdiagnostic approaches focus less on diagnostic differences and more on these shared underlying principles and processes.

Most transdiagnostic approaches have typically fallen into two broad categories. The first outlines interventions that could be delivered across a broad group of related diagnoses, such as mixed anxiety disorders (e.g. Norton & Hope, 2005), a range of eating disorders (Fairburn *et al.*, 2003) and post-psychosis emotional dysfunction (White *et al.*, 2011). In physical health settings, examples include psychological interventions being used with a group of related physical diagnoses for bowel disorders (Drossman *et al.*, 2003) and cardiac diseases (Elliot *et al.*, 2014).

The second category of transdiagnostic research proposes that psychological treatment can be applied across the majority of disorders with minimal adaptation. Examples include a cognitive behavioural therapy (CBT) protocol for a range of anxiety and depression disorders (McEvoy & Nathan, 2007). One psychological intervention model that fits particularly well with this category is Acceptance and Commitment Therapy (ACT; Hayes *et al.*, 2011). ACT has developed alongside a programme of basic research proposing a behaviour analytic theory of the influence of language and cognition on behaviour, called Relational Frame Theory (RFT; Hayes, Barnes-Holmes & Roche, 2001). Many of the central features of ACT are informed by an RFT analysis of the effect of cognition on behaviour. ACT considers that psychological disorder occurs when an individual tries to eliminate or reduce unpleasant internal experiences, such as distressing thoughts, emotions and sensations, even when doing so is likely to increase distress and limit their ability to lead a meaningful life (McCracken, 1998). The ACT model refers to this as *psychological inflexibility*, and suggests that its influence over how humans respond can be a feature across psychological and physical disorders. ACT interventions seek to develop more flexible responses, encouraging individuals to accept difficult or adverse experiences where doing so will enable a richer and more meaningful life.

Six overlapping and interdependent processes have been identified and are thought to contribute to psychological flexibility: acceptance (willingly allowing aversive experiences to occur, rather than avoiding them), cognitive defusion (ability to step back and separate oneself from cognitions, rather than becoming entangled with them), contact with the present moment (non-judgemental awareness of the present moment, contrasted with dominance of past or future events), values (clarity about personal values), committed action (acting in accordance with personal values, rather than in an attempt to reduce aversive experiences) and self-as-context (a flexible repertoire of perspective-taking skills, rather than attachment to a dominant narrative about ourselves and others) (Hayes *et al.*, 2006). Techniques based on these processes aim to help individuals to become more flexible in their response to difficulties, and less reliant on avoiding these experiences.

Evidence for ACT spans a range of populations, including physical health settings. Examples include chronic pain (Vowles & McCracken, 2008), diabetes (Gregg *et al.*, 2007), epilepsy (Lundgren *et al.*, 2006), cancer (Rost *et al.*, 2012) and irritable bowel syndrome (Ferreira, 2011). Much of this research takes a transdiagnostic approach by including a range of psychological comorbidities. One trial in a non-physical health setting has also reported evidence suggesting ACT is an effective intervention for a psychologically transdiagnostic group, which included anxiety and depression diagnoses (Forman *et al.* 2007).

Psychological interventions in physical health settings are often delivered in group format and have a good evidence-base for LTC (Brassington *et al.*, under review). Group psychological therapy encompasses a wide range of formats, ranging from a focus on psychodynamic interpersonal transactions (such as those based on Yalom's (2005) group principles) to didactic psychoeducation interventions, with many interventions blending elements of both (Beiling,

McCabe and Antony, 2013) Evidence suggests that group therapy is as effective as individual therapy (Burlingame, Mackenzie & Strauss, 2004; Whitfield, 2010) and offers the potential for cost savings (Morrison, 2001; Tucker & Oei, 2007). In addition to this, group therapy offers additional benefits over an individual format, such as reducing social isolation and increasing learning opportunities through a wider range of interpersonal contacts (Bieling, McCabe & Antony, 2013). It is unsurprising then that much ACT research has used group format in physical health settings.

Research into ACT interventions has also considered the mechanisms of change that are important to outcomes. This is important as it helps us understand how the therapy works, how it can be further developed, and provides evidence for the scientific basis of the model (Hayes *et al.*, 2006). A number of studies have reported such mediation analysis for ACT interventions in chronic health settings, highlighting acceptance processes as a mediator of outcome in patients with diabetes (Gregg *et al.*, 2007), and valued living as a mediator in people with epilepsy (Lundgren, Dahl & Hayes, 2008).

It is in this context that a novel ACT group intervention was developed for people with a range of LTC presenting to psychological health services in a U.K. National Health Service (NHS) setting. This study hypothesized that: (i) ACT would reduce psychological distress significantly relative to a control period in a physically and psychologically transdiagnostic group living with LTC, and (ii) valued living behaviours and psychological flexibility would mediate this outcome.

Methodology

Participants

Potential participants were identified by clinicians in a U.K. NHS Clinical Psychology department. Seventy-three individuals were invited to an eligibility interview with one of the two group facilitators (LB and PL). To be included, participants needed to be: aged 18 or over, English-speaking and have a long-term physical health condition (specified as having been present for a minimum of 12 months). For the purposes of this study, cancer was not included due to the difficulties classifying it as either acute or chronic, and whether long-term self-management is required by sufferers. Participants were excluded if they had significant cognitive impairment, suicidal ideation or language or hearing difficulties, and instead received standard care. Seven groups, with between four and nine participants, took place across two locations in an NHS trust.

G*Power (Faul, Erdfelder, Lang & Buchner, 2008) was used to calculate a target sample size for this study. Literature to date has found large and medium effect sizes in condition-specific ACT intervention studies (e.g. Lundgren *et al.*, 2006; Westin *et al.*, 2007; Gregg *et al.*, 2007; McCracken, Vowles, & Eccleston, 2005; Ferreira, 2011). A conservative medium effect size (f=.25) was predicted for this study, and calculations indicated a required sample size of 31 group completers ($\alpha \leq 0.05$, $\beta \geq 0.80$).

Procedure

A repeated measures design was used, with five outcome measures collected at 4 time points: baseline, immediately prior to session 1, end of session 6 and 3 month follow-up, as shown in Figure 1. The period from T_1 to T_2 served as the control period. This approach was selected to control for treatment effects while also offering treatment to all participants within an acceptable timescale. Referring clinicians were asked to discontinue individual appointments during the control and intervention periods where possible. Participants who failed to attend their eligibility interview were contacted and offered an alternative date. Similarly, if a participant missed a group session, they were offered the option of a group facilitator telephoning them to discuss the content and homework associated with the session they missed. Participants who attended less than 2 sessions of the group (one third of the intervention) were considered non-completers. Approval for this study was received from the East of Scotland Research Ethics Service. Potential participants were issued with an information leaflet about the study and gave informed consent.

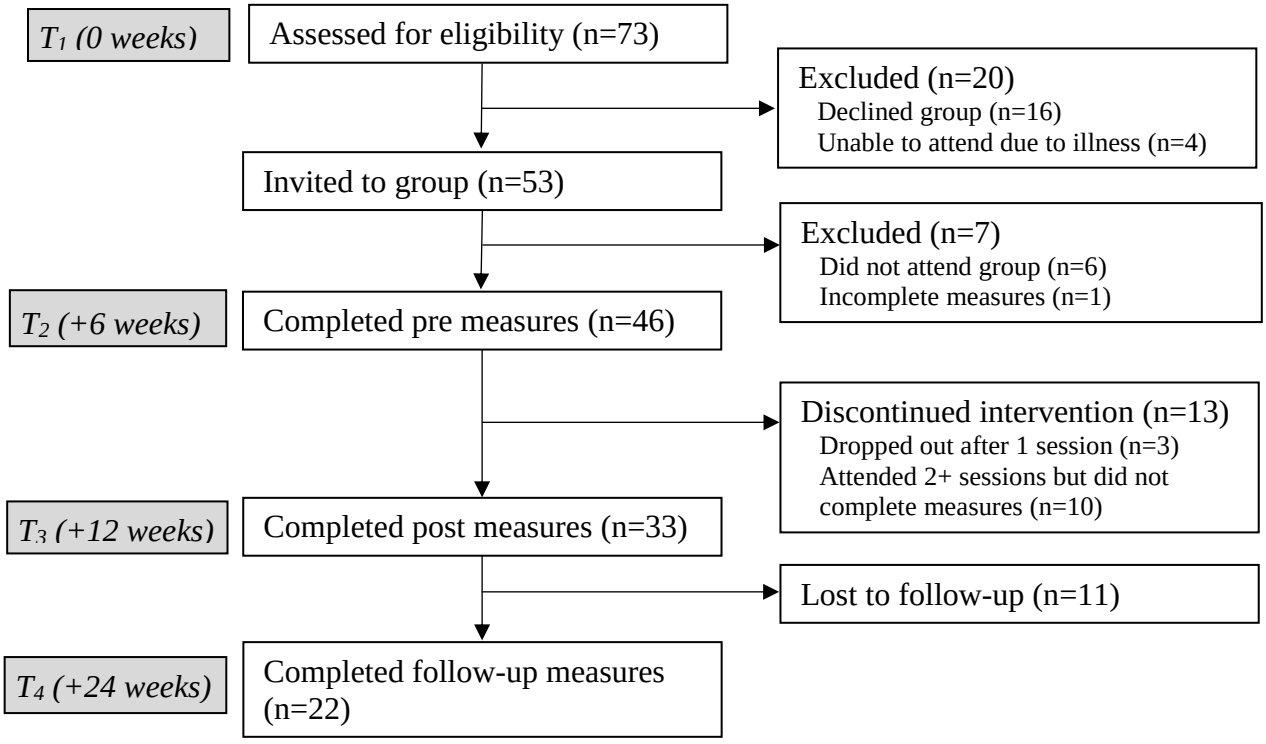

Figure 1: CONSORT flow chart

Measures

Participants were asked to complete five questionnaires at each time point. The primary measure was selected to measure psychological distress. Secondary outcomes were two questionnaires to assess health status. Process measures included assessments of psychological flexibility and valued living, two key ACT processes.

Psychological distress

The primary outcome measure used was the Hospital Anxiety and Depression Scale (HADS, Zigmund & Snaith, 1983). The HADS is a brief, well-established and routinely used measure of symptoms of anxiety and depression with strong test-retest reliability ($r>0.80$; Spinhoven *et al.*, 1997) and internal consistency (Cronbach $\alpha>0.75$; Mykletun *et al.*, 2001; Bjelland *et al.*, 2002). It is a self-report questionnaire containing 14 items and asks respondents to indicate the frequency that they have experienced each symptom over the previous seven days on a 4-point scale. Separate scores for anxiety and depression symptoms can be calculated, with higher scores corresponding to greater severity of symptoms. This measure, originally designed for medical outpatients, has been validated for use with a number of chronic health problems, including coronary heart disease (Stafford *et al.*, 2007), myocardial infarction and stroke (Johnston *et al.*, 2000) and multiple sclerosis (Honarmand & Feinstein, 2009).

Health-related quality of life

The RAND 36-item Health Survey 1.0 (SF-36; Ware & Shelbourne, 1992) is a self-report measure of health-related quality of life (HRQOL), based on the assumption that a number of health factors contribute to perception of HRQOL. To address this, the questionnaire assesses eight health domains: physical functioning, bodily pain, physical role limitations, emotional role limitations, emotional wellbeing, social functioning, energy / fatigue and health

perceptions. Responses are recoded and averaged within each of these health areas to produce scaled scores, with high scores indicating a more favourable quality of life. This widely-used questionnaire has strong reliability (Cronbach α ranging from 0.78 to 0.93), and validity across a number of health conditions, including hypertension, diabetes, congestive heart failure and myocardial infarction (McHorney *et al.*, 1994).

Illness perceptions

The Brief Illness Perception Questionnaire (BIPQ; Broadbent *et al.*, 2006) is an 8-item self-report questionnaire with each question using an 11-point scale. The questions relate to perceptions about different aspects of health, from how long they expect their health problems to last, to how much control they feel they have over their illness. As such, this provides a measure of participants' cognitive evaluation of their health status. The authors suggest that three of the eight items are reverse scored to provide an overall score, and validation data across a number of health settings indicates good test-retest reliability and concurrent validity with a number of relevant measures (Cronbach α = 0.72; Løchting *et al.*, 2013).

Psychological flexibility

To assess psychological flexibility as a general process, the Acceptance and Action Questionnaire II (AAQ-II; Bond *et al.*, 2011) was included. This self-report questionnaire includes 7 statements rated on a 7-point Likert scale from "Never true" to "Always true". Scores can be summed to produce an overall score, with higher scores indicating lower levels of acceptance and psychological flexibility. Reliability of this questionnaire is strong (mean α = 0.84) and its validity is well established via strong correlations with theoretically predicted other constructs, such as Beck Depression Inventory (r=0.71) and Symptom Checklist-90 (0.70; *Bond et al.*, 2011). Illness-specific variations of this measure have been developed, but

due to the transdiagnostic nature of this intervention, the AAQ-II was considered to be the most appropriate.

Valued living

The Valuing Questionnaire (Smout *et al.*, 2014), a 10-item self-report measure, was selected to assess changes in valued living. It asks respondents to rate statements on a scale from 0 ("Not at all true") to 6 ("Completely true") with half of the items targeting progress towards living life in accordance with values (such as "I continued to get better at being the kind of person I want to be"), and the remainder targeting barriers and obstructions to this (for example, "It seemed like I was just 'going through the motions', rather than focusing on what was important to me"). Separate scores for progress and obstruction can be summed, with higher scores on the progress scale indicating greater valued living behaviours, and higher obstruction scale scores indicating impaired valued-living. The authors report good internal consistency (Cronbach $\alpha = 0.94$) and correlations between both subscales and existing validated measures of psychological wellbeing and distress, respectively (r=0.19-0.70, Smout *et al.*, 2014).

Intervention

The group intervention comprised weekly sessions for six weeks, lasting 2.5 hours (including a short break), plus two follow-up sessions one and three months later. Groups were staggered across the year to mitigate any seasonal effects that could compound treatment effects. A treatment manual was developed by the authors based on existing evidence-based ACT protocols for specific physical health conditions such as irritable bowel syndrome and chronic pain (Ferreira & Gillanders, 2012; Vowles & McCracken, 2008; available on www.contextualscience.org/better_living_with_illness). As well as all of the ACT processes (cognitive defusion, present moment awareness, self as context, values, acceptance and

committed action), the protocol also included four additional elements to address common barriers to increasing behaviours in line with personal values for people living with LTC: problem solving skills, pacing to gradually improve function, assertive communication skills and goal setting. These elements were considered part of the therapy and were consistent with ACT in their delivery (e.g. pacing to increased valued behaviours rather than minimise aversive experiences such as pain).

The manual focused on experiential exercises and the use of metaphors in accordance with the principles of the ACT model. Participants were provided with workbooks to use during and following group sessions (e.g. to structure homework and remind them of content and exercises covered) and a CD containing mindfulness exercises to facilitate practice of this skill outside of group sessions. Table 1 outlines the content of the group sessions.

Table 1: Session content of group

Session	Content
1	Introductions and treatment rationale. Creative hopelessness exercises, including primary / secondary suffering and workability of coping strategies.
2	Getting stuck with symptoms, thoughts and feelings versus moving forward with them using an experiential version of Passengers on the Bus metaphor[1]. An introduction to mindfulness.
3	Clarification of personal values.
4	Goal setting, cognitive defusion from thoughts and problem solving skills.
5	Assertive communication skills, willingness and committing to action.
6	Pacing, review of intervention and setback preparation.
Follow ups	Tailored to specific ongoing issues in making progress with goals.

[1] Metaphor adapted from Hayes, Strohsal and Wilson (1999), accessed at http://onlinelibrary.wiley.com/store/10.1002/9781118499184.app3/asset/app3.pdf?v=1&t=i6g9tsdr&s=5b178d9f490701b0b4387959ed88e4b65a30daa4 or available in the intervention protocol.

Facilitators of the group were a Health Psychologist (PL) with extensive experience delivering group psychological interventions, and a postgraduate doctoral student in clinical psychology (LB). Both facilitators received more than six days generic training in the ACT model, as well as two training sessions specific to this intervention. This training included teaching, experiential exercises and role play covering the core exercises in the manual and discussion of scenarios that may occur in therapy. Supervision, including using audiotapes, comprised of at least two meetings per group with DG, a founder member of the Association for Contextual Behavioural Science, and NF, both experienced researchers and trainers of ACT, in addition to regular individual supervision with SY, an ACT-trained Clinical Psychologist with extensive experience working with people with LTC.

Statistical Analyses

Data analyses was conducted using Statistical Package for the Social Sciences (SPSS) version 21.0. Data was checked for errors or missing data. Where missing data was less than 5%, mean imputation, case mean imputation (for individual questions) or sample mean imputation (for whole missing questionnaires) was used (Chavance, 2004). Repeated measure ANOVAS with post-hoc Bonferroni adjusted pairwise comparisons were used to analyse results both for complete sets of pre-post data (using last-observation-carried-forward (LOCF), for participants lost to follow-up) alongside a more conservative intention-to-treat (ITT) method, with scores returning to pre-intervention (T_2) level for participants who discontinued. Only participants who attended at least 2 sessions of the intervention were included in the analyses. Where Mauchly's test showed that sphericity had been violated, Greenhouse-Geiser (if $\varepsilon<.75$) or Huynh-Feldt (if $\varepsilon>.75$) corrections were used. Significant changes in the primary outcomes were predicted to be mediated by changes in psychological flexibility and valued living. As such, a mediation model with these processes as possible mediators was tested using an Ordinary Least Squares (OLS) method (Judd, Kenny & McClelland, 2001) for ITT data, with

scores returning to pre-intervention for drop-outs. Bootstrapping was used given the small sample size.

Results

Preliminary Analyses

Table 2: Participant characteristics

Characteristic		Completers (n=43)	Non-completers (n=10)	p
Mean age in years (SD)		49.32 (12.17)	52.67 (16.93)	0.490 [t]
Mean LTC duration in months (SD)		145.05 (118.64)	122.33 (157.29)	0.627 [t]
Gender (%)		30 female (69.77%) 13 male (30.23%)	6 female (60.00%) 4 male (40.00%)	0.709 [PC]
Ethnic (%)				0.848 [PC]
	White	38 (88.37%)	7 (70.00%)	
	Mixed	1 (2.33%)	0 (0.00%)	
	Missing	4 (9.30%)	3 (30.00%)	
Employment status (%)				0.453 [FE]
	Employed	15 (34.88%)	2 (20.00%)	
	Student	1 (2.33%)	0	
	Unemployed	15 (34.88%)	3 (30.00%)	
	Retired	8 (18.60%)	4 (40.00%)	
	Missing	4 (9.30%)	1 (10.00%)	
Marital status (%)				0.654 [FE]
	Married	25 (58.14%)	5 (50.00%)	
	Co-habiting	8 (18.60%)	3 (30.00%)	
	Single	7 (16.28%)	1 (10.00%)	
	Relationship	2 (4.65%)	0	
	Widowed	1 (2.33%)	1 (10.00%)	
Physical health condition (%)				0.321 [FE]
	Chronic pain	13 (30.23%)	2 (20.00%)	
	Neurological	9 (20.93%)	1 (10.00%)	
	Diabetes	5 (11.63%)	2 (20.00%)	
	Bowel	5 (11.63%)	1 (10.00%)	
	Osteological	2 (4.65%)	0	
	Renal	3 (6.98%)	0	
	Cardiological	1 (2.33%)	2 (20.00%)	
	Respiratory	0	1 (10.00%)	
	Arthritis	1 (2.33%)	0	
	Other	4 (9.30%)	1 (10.00%)	

NOTE: t=t-test; PC=Pearson Chi-square; FE=Fisher's Exact test.

Table 3: Characteristics at baseline

	Completers n= 43 (Mean (SD))	Non-Completers n=10 (Mean (SD))	p
HADS Depression	10.51 (4.35)	10.10 (2.77)	0.711
HADS Anxiety	12.91 (4.31)	13.40 (2.07)	0.599
AAQ-II	34.98 (10.34)	32.78 (9.59)	0.561
VQ Progress	13.71 (7.24)	13.50 (5.08)	0.932
VQ Obstruction	21.21 (6.18)	19.00 (4.14)	0.289
BIPQ	58.57 (17.94)	52.40 (7.82)	0.295
SF36 Physical	40.47 (32.47)	34.17 (23.40)	0.566
SF36 Physical Limits	12.80 (25.69)	8.33 (12.50)	0.615
SF36 Emotional Limits	17.89 (26.97)	22.22 (33.33)	0.677
SF36 Fatigue	22.56 (16.31)	31.00 (23.66)	0.307
SF36 Emotions	42.42 (19.87)	46.40 (18.40)	0.566
SF36 Social	31.25 (23.30)	36.11 (28.26)	0.587
SF36 Pain	32.50 (25.82)	30.83 (25.40)	0.861
SF36 General	21.19 (17.43)	29.00 (23.07)	0.236

Examination indicated that missing data was missing completely at random, with 0.57% of whole questionnaires missing, and a further 0.58% of individual questions missing. As such, mean imputation used to replace missing values (Chavance, 2004). The majority of variables were found to have normal distributions sufficient for assumptions of robust parametric tests (Field, 2009), with the exception of the Physical Limits, Emotional Limits, Fatigue and General subscales of the SF-36. Attempts to correct non-normal data were unsuccessful, and as such non-parametric tests were used for this data.

Completers (those who attended two or more sessions) and non-completers did not differ significantly at baseline in terms of demographic characteristics or measures (see Tables 2 and

3). The average number of sessions attended by completers was 5.70 (SD=1.95; Mode=7). One participant received one individual session during the control period, and another received one individual session during the intervention period. Three participants received a telephone catchup for a missed session.

Primary Analyses

To investigate the first hypothesis of this study, repeated measures ANOVA analyses were conducted on HADS scores across the four time points for participants who completed post-intervention measures at T_3 (n=33). As predicted, significant reductions in HADS scores were found, with large effect sizes (see Table 4). Post-hoc comparisons in Table 5 indicated that there was no change in HADS scores during the control period (T_1-T_2), but found significant change in scores between pre- and post-intervention (T_2-T_3) with no significant difference between post-intervention and follow-up scores (T_3-T_4). Overall, this suggests that psychological distress reduced following intervention, and that these effects were maintained at 3-month follow-up.

To control for a possible bias effect of excluding those who did not complete post-intervention measures, data was also analysed on an ITT basis with the conservative assumption that post treatment scores deteriorated to baseline levels (n=43). These results supported the completers analyses, with significant reductions in HADS scores with medium effect sizes (see Table 6). Post-hoc comparisons in Table 7 also highlighted no change in HADS scores during the control period (T_1-T_2), but significant reductions in scores between pre- and post-intervention (T_2-T_3) with no significant difference between post-intervention and follow-up scores (T_3-T_4). Overall, this further supports the hypothesis that psychological distress reduced following intervention, and that these effects were maintained at 3-month follow-up.

Table 4: Repeated measures ANOVA for pre-post completers[#]

N=33		T_1 Baseline	T_2 Pre	T_3 Post	T_4 Follow-up	F	p	Effect size η_p^2
HADS	Depression	11.27 (4.09)	11.45 (4.09)	9.56 (4.89)	9.23 (4.82)	9.93	<0.001	.237
	Anxiety	13.21 (3.95)	13.43 (3.52)	11.92 (4.10)	11.49 (3.61)	7.266	0.001[g]	.185
	Total	24.48 (7.13)	24.88 (6.93)	21.48 (8.59)	20.72 (7.68)	12.725	0.000[h]	.285
AAQ-II		36.16 (9.04)	35.72 (9.50)	31.61 (9.29)	33.48 (14.78)	3.043	0.056[g]	.087
VQ	Obstruction	22.40 (5.54)	20.35 (5.50)	19.06 (7.53)	17.99 (6.95)	6.033	0.002[h]	.159
	Progress	12.23 (6.62)	13.26 (7.05)	16.19 (7.38)	16.29 (7.26)	6.393	0.001	.167
BIPQ		60.02 (19.88)	57.39 (10.07)	53.73 (11.48)	52.85 (11.70)	3.259	0.061[g]	.092
SF36	Physical	38.94 (29.76)	34.01 (28.52)	36.97 (28.14)	35.91 (28.12)	1.200	0.312[h]	.036
	Physical Limits*	9.11 (17.20)	4.77 (13.17)	21.97 (17.85)	21.97 (33.52)	11.507	0.009	.032
	Emotional Limits*	14.22 (23.25)	15.50 (30.04)	21.35 (16.88)	38.38 (42.59)	12.907	0.005	.038
	Fatigue*	22.73 (15.96)	21.97 (17.85)	21.97 (32.93)	28.18 (21.71)	5.612	0.132	.007
	Emotions	41.33 (19.64)	43.88 (20.38)	48.88 (19.74)	50.30 (19.82)	4.171	0.008	.115
	Social	29.59 (20.64)	29.21 (24.20)	37.11 (25.67)	37.50 (28.47)	2.990	0.052[g]	.085
	Pain	33.27 (24.59)	25.83 (21.88)	30.78 (24.37)	31.59 (23.67)	2.887	0.050[h]	.083
	General*	20.86 (16.52)	21.35 (16.88)	23.14 (15.06)	25.15 (18.31)	2.416	0.491	<.001

[#] Last observation carried forward used for missing follow-up data

g Greenhouse-geisser adjusted significance levels used due to sphericity violation, where epsilon<0.75

h Huyhn-Felder adjusted significance levels used due to sphericity violation, where epsilon>0.75

* Friedman's ANOVA used as non-normal distribution, with r^2 calculations for effect sizes

NOTE: HADS=Hospital Anxiety and Depression Scale; AAQ-II=Acceptance and Action Questionnaire-II; VQ=Valuing Questionaire; SF36=Rand Short Form 36

Table 5: Post-hoc comparisons (pre-post completers)[#]

		T_1 vs T_2		T_2 vs T_3		T_3 vs T_4	
N=33		**MDiff**	η_p^2	**MDiff**	η_p^2	**MDiff**	η_p^2
HADS	Depression	-0.178	.006	1.888	.268**	0.333	.016
	Anxiety	-0.215	.007	1.509	.210**	0.424	.031
	Total	-0.393	.012	3.398	.328***	0.758	.031
AAQ-II		0.435	.004	4.116	.294**	-1.879	.026
VQ	Progress	-1.023	.028	-2.930	.178*	-0.106	.000
	Obstruction	2.052	.139*	1.286	.054	1.070	.033
BIPQ		2.628	.018	3.662	.158*	0.878	.020
SF36	Physical	4.933	.090	-2.963	.049	1.061	.011
	Physical Limits*	4.342	.008	-17.203	.058**	0.000	<.001
	Emotional Limits*	-1.281	<.001	-17.837	.036*	-5.051	.005
	Fatigue*	0.758	.005	-7.869	.024*	1.662	.003
	Emotions	-2.545	.029	-5.000	.112	-1.424	.010
	Pain	7.436	.246**	-4.948	.088	-0.810	.006
	Social	0.379	.000	-7.895	.164*	-0.391	.000
	General	-0.491	.005	-1.790	.005	-2.012	.002

[#] Last observation carried forward used for missing follow-up data
* p < .05; ** p < .01; *** p < .001
* Post-hoc comparisons used Wilcoxon signed-rank teat as non-normal distribution, with r^2 calculations for effect sizes
NOTE: HADS=Hospital Anxiety and Depression Scale; AAQ-II=Acceptance and Action Questionnaire-II; VQ=Valuing Questionaire; SF36=Rand Short Form 36

Table 6: Repeated measures ANOVA (ITT)

n=43		Baseline Mean (SD)	Pre Mean (SD)	Post Mean (SD)	Follow-up Mean (SD)	F	p	Effect size η_p^2
HADS	Depression	10.51 (4.34)	10.89 (4.29)	9.43 (4.77)	9.32 (4.54)	5.772	0.001	.121
	Anxiety	12.91 (4.31)	13.10 (3.78)	11.94 (4.16)	11.77 (3.55)	4.954	0.005[h]	.105
	Total	23.42 (7.82)	23.98 (7.33)	21.37 (8.40)	21.09 (7.35)	7.643	0.000[h]	.154
AAQ-II		35.17 (10.29)	35.48 (9.25)	32.33 (9.17)	34.86 (13.54)	1.998	0.136[g]	.045
VQ	Progress	13.74 (7.07)	14.48 (7.41)	16.73 (7.38)	16.33 (7.49)	4.588	0.004	.098
	Obstruction	21.21 (6.11)	20.43 (5.29)	19.44 (6.97)	18.34 (5.91)	3.438	0.025[h]	.076
BIPQ		58.80 (17.79)	57.02 (9.63)	54.21 (10.77)	53.93 (10.27)	2.541	0.101[g]	.057
SF36	Physical	40.47 (32.47)	35.40 (32.13)	37.67 (31.80)	36.51 (31.74)	2.203	0.100[h]	.050
	Physical Limits*	12.80 (25.07)	9.70 (24.33)	22.90 (34.73)	21.16 (34.36)	9.688	0.021	.024
	Emotional Limits*	17.89 (26.32)	18.53 (32.59)	32.21 (41.52)	32.99 (42.47)	9.293	0.026	.022
	Fatigue*	22.56 (16.31)	24.88 (19.59)	30.92 (22.34)	28.72 (20.56)	5.729	0.126	.008
	Emotions	42.42 (19.87)	44.84 (21.16)	48.67 (20.62)	48.65 (21.18)	3.128	0.028	.069
	Social	29.69 (21.27)	28.82 (24.06)	34.87 (25.52)	36.05 (26.89)	2.772	0.061[g]	.062
	Pain	32.51 (25.20)	28.90 (24.28)	32.69 (25.65)	32.15 (25.32)	1.343	0.263	.031
	General*	12.62 (17.12)	22.31 (18.37)	23.69 (17.06)	24.53 (19.30)	1.320	0.724	.002

[g] Greenhouse-geisser adjusted significance levels used due to sphericity violation, where epsilon<0.75
h Huyhn-Felder adjusted significance levels used due to sphericity violation, where epsilon>0.75
* Friedman's ANOVA used as non-normal distribution, with r^2 calculations for effect sizes
NOTE: HADS=Hospital Anxiety and Depression Scale; AAQ-II=Acceptance and Action Questionnaire-II; VQ=Valuing Questionaire; SF36=Rand Short Form 36

Table 7: Post-hoc comparisons (ITT)

N=43		T_1 vs T_2		T_2 vs T_3		T_3 vs T_4	
		MDiff	η_p^2	**MDiff**	η_p^2	**MDiff**	η_p^2
HADS	Depression	-0.369	.023	1.449	.206**	0.109	.001
	Anxiety	-0.118	.006	1.158	.161**	0.167	.004
	Total	-.558	.025	2.607	.252**	.276	.003
AAQ-II		-0.317	.002	3.159	.225**	-2.535	.050
VQ	Progress	-0.739	.015	-2.249	.137*	0.395	.004
	Obstruction	0.784	.018	0.987	.042	1.100	.031
BIPQ		1.784	.010	2.810	.121*	0.275	.002
SF36	Physical	5.065	.109*	-2.274	.038	1.163	.010
	Physical Limits*	3.107	.008	-13.202	.058**	1.744	<.001
	Emotional Limits*	-0.639	<.001	-13.689	.036*	-0.775	<.001
	Fatigue*	-2.326	.005	-6.040	.024*	2.202	.002
	Emotions	-2.419	.024	-3.838	.086	0.024	.000
	Pain	3.614	.003	-3.797	.126	0.541	.004
	Social	0.872	.060	-6.059	.068*	-1.172	.002
	General	-.696	.005	-1.374	.005	-0.847	<.001

* p < .05; ** p < .01; *** p < .001
* Post-hoc comparisons used Wilcoxon signed-rank teat as non-normal distribution, with r^2 calculations for effect sizes
NOTE: HADS=Hospital Anxiety and Depression Scale; AAQ-II=Acceptance and Action Questionnaire-II; VQ=Valuing Questionaire; SF36=Rand Short Form 36

Secondary Analyses

Health status measures were also analysed, both for completers and using ITT. No significant change was found in illness perceptions (BIPQ) or health status (SF-36) using either approach to analysis, with change detected in only the physical limitations, emotional limitations and emotions domains of the SF-36 (see Tables 4 and 6). However, these findings should be interpreted with caution given the large amount of variance in SF-36 scores. Overall, this suggests that limitations to daily living improved following intervention, but that improvements in this and psychological distress occurred without improvements in overall health status or cognitive evaluation of health problems.

Process Analyses

Analyses also suggested that both obstruction and progress VQ scores significantly changed over time, for both completers and ITT analysis with small to medium effect sizes (see Tables 4 and 6). Post-hoc comparisons for progress scores indicated a significant improvement from pre- to post-intervention (T_2-T_3) with no change in the control period (T_1-T_2) or follow-up period (T_3-T_4) for completers and ITT analyses (see Table 5 & 7). However, comparisons for completers on the obstruction scale indicated a statistically significant improvement during the control period (T_1-T_2), but a non-significant improvement from pre- to post-intervention (T_2-T_3) that continued into the follow-up period (T_3-T_4). Further, under ITT analyses, these findings reduced, with no significant differences between time points found (see Table 7). This suggests a general effect of time on VQ scores, but that the effect was a general trend rather than an effect relating to specific time periods. Taken together, this evidence gives preliminary support for valued living improvements following intervention.

Measures of psychological flexibility were also subjected to completers and ITT analyses. Results indicated a small reduction in psychological inflexibility (AAQ-II) that approached significance (p=.056), in the completers analyses, with this near effect vanishing in the ITT data (see Tables 4 & 6). Inspection of post-hoc comparisons highlights a significant improvement in AAQ-II scores between pre- and post-intervention (T_2-T_3; see Table 5 & 7), with no change in the control period (T_1-T_2) or follow-up period (T_3-T_4). Overall, this suggests a more complex effect for this measure of psychological inflexibility, but that there was some change in this variable post-intervention.

Mediation Analyses

Table 8: Mediation analyses for AAQ-II and VQ Progress outcomes (pre-post ITT data)

Dependent Variable	Predictor	R^2	F Change	p	Bootstrapped standardized beta coefficients (β)			
					B	t	p β	Confidence interval
T2 HADS	T2 AAQ-II	0.554	53.209	<.001	0.595	7.294	<.001	0.461 - 0.790
T3 HADS	T3 AAQ-II	0.622	70.030	<.001	0.728	0.067	<.001	0.599 - 0.866
T3-T2 HADS	1) T3+T2 AAQ-II	0.236	1.042	.314	0.036	1.021	.289	-0.44 – 0.093
	2) T3-T2 AAQ-II	0.235	13.926	.001	0.388	3.748	.004	0.144 – 0.596
T2 HADS	T2 VQ Progress	0.495	42.096	<.001	0.704	6.488	<.001	0.521 - 0.887
T3 HADS	T3 VQ Progress	0.524	47.242	<.001	0.833	6.873	<.001	0.618 - 1.085
T3-T2 HADS	1) T3+T2 VQ Progress	0.278	1.426	.239	0.052	1.194	.161	-0.14 - 0.130
	2) T3-T2 VQ Progress	0.271	16.590	<.001	0.428	4.100	.007	0.159 - 0.695

In order to assess whether changes in these process measures mediated change in the total HADS scores from pre- to post-intervention (T_2-T_3), a within-subjects mediation analysis was conducted as recommended by Judd, Kenny and McClelland (2001). Judd and colleagues propose that a number of assumptions must first be met in order to complete mediation analysis on a within-subjects study.

Firstly, there must be significant change between time points for both process and outcome variables. The findings reported in Table 7 indicate this is true for VQ Progress and psychological flexibility measures (AAQ-II), but not VQ Obstruction scores. Secondly, all measures must be scaled in the same direction, so that increases in outcome scores correspond to increases in process scores. The VQ Progress scale was reversed so that reduced scores indicated improvements in valued living.

As shown in Table 8, AAQ-II significantly predicted HADS scores at T_2 (β=0.554, $p<0.001$) and T_3 (β=0.728, $p<0.001$). Further, the mean difference for AAQ-II (T2-T3) significantly predicted the mean difference in HADS score for the same period (β=0.388, $p=0.004$), over the mean sum in AAQ-II (T2+T3) (β=0.036, $p<0.289$), indicating that improved psychological flexibility mediated the observed change in HADS scores in the ITT analyses.

A similar pattern was found for VQ Progress scores, which significantly predicted HADS scores at T_2 (β=0.704, $p<0.001$) and T_3 (β=0.833, $p<0.001$). The mean difference for VQ Progress between these time points (T2-T3) also significantly predicted the mean difference in HADS score for the same period (β=0.428, $p=0.007$), over the mean sum of VQ Progress (T2+T3) (β=0.052, $p<0.161$), indicating that progress with valued living behaviours also mediated the observed change in HADS scores in the ITT analyses.

Discussion

The primary aim of this study was to develop and evaluate the effectiveness of an ACT group intervention for a transdiagnostic sample of patients living with LTC. Overall, the results support the use of this intervention and suggest that it is effective in reducing psychological distress. This conclusion was supported by medium to large effect sizes for these improvements and are broadly in line with similar research in clinical health outpatient settings (e.g. Vowles, Wetherell & Sorell, 2009; Gregg *et al.*, 2007; McCracken, Sato & Taylor, 2013). There were similar benefits in the extent to which participants felt limited by their health problems, but limited change in cognitive evaluation of health problems and self-rated health status. This is consistent with the therapeutic aims of the intervention, with psychological improvements occurring in the context of no or limited change in health problems.

In line with previous research, improvements in general psychological flexibility and progress with valued living mediated reductions in psychological distress (Vowles *et al.*, 2014; Gregg *et al.*, 2007; Ferreira, 2011; Lundgren, Dahl & Hayes, 2008). Many clinical health studies use illness-specific adaptations of psychological flexibility, rather than the general measure used in this study (e.g. diabetes: Gregg *et al.*, 2007; chronic pain: McCracken, Vowles & Eccleston, 2004; tinnitus: Westin, Hayes & Andersson, 2008). Both general and illness-specific psychological flexibility have correlations with psychological distress, with general measures explaining additional variance independent of illness-specific measures (McCracken & Zhao-O'Brien, 2010). Yet most research has used illness-specific measures of psychological flexibility in mediation analysis. A useful development for the future, therefore, might be a general adapted version of the AAQ that combines both general psychological flexibility and questions specific to health conditions, while maintaining a transdiagnostic stance to the latter.

While progress in valued living was highlighted as a mediator in the present study, it was somewhat surprising that obstructions to valued living did not also, particularly as this scale has strong correlations with psychological flexibility (Smout *et al.*, 2014). One possible explanation for this is the qualitative difference between the progress and obstruction scales of the VQ. Whereas the progress scale measures improvements in valued living, the obstruction scale assesses ability to overcome barriers to progress. As the intervention was relatively brief, it is likely that such obstructions continued to be challenging for participants. Further, this measure is novel and not health specific, and the authors understand this to be the first trial of this measure in such a setting. As such, it may not have been sensitive to change with this population.

Limitations and Strengths

A number of limitations in this study should be noted. Although controlled, the present study had a modest sample size and was conducted as a pilot study without an active treatment comparison. The study relied on self-report measures which have a number of drawbacks, such as respondent fatigue and socially desirable responding (Hess, Hensher & Daly, 2012; Helmes and Holden, 2003). They do however provide a practical, cost-effective way of measuring outcome and process. It would be useful for future research to use a broader but consistent range of measures. This should include aspects of general and health-specific psychological flexibility, as well as a range of ACT process-specific measures, such as the VQ and Cognitive Fusion Questionnaire (Gillanders *et al.*, 2014).

It is worth noting that diagnostic thresholds were not included in the eligibility criteria of this study, and as such, baseline levels of psychological distress varied with some participants

reporting below-threshold symptoms of anxiety and depression. Diagnostic thresholds in a transdiagnostic group present obvious challenges, with different psychological disorders having very different parameters for caseness. This context of low baseline distress was not, however, a barrier to significant reductions in distress, and is consistent with how clinical settings may accept referrals to groups. Despite these limitations, the significant findings warrant further investigation in larger samples, with active treatment comparisons.

The naturalistic approach of this study, operating in a clinical setting, is one of its key strengths and facilitates generalizability of the findings. The use of a controlled repeated measures design allowed conclusions to be drawn from a sample size that was realistic in a clinical setting but would have been insufficient for a randomized controlled study.

Theoretical implications

These findings are important in the context of the ongoing debate between the use of diagnosis-specific and transdiagnostic approaches to research and psychological interventions. Health services are often organised by diagnosis, which can be a barrier to implementing transdiagnostic approaches (Mansell *et al.*, 2009). So it is encouraging then that this transdiagnostic study was effectively integrated under such constraints. Much of the transdiagnostic research to date has focused on common processes, in particular which factors relate to a range of major psychological disorder categories (Levin *et al.*, 2014). While this is important in setting the context for this work, it has become fragmented with a large number of inter-related processes implicated in a broad range of conditions (Aldao, Nolen-Hoeksema & Schweizer, 2010; Mansell *et al.*, 2009). In contrast to this, psychological inflexibility as a transdiagnostic process has been described as a continuum or dimension that could contribute to most psychological disorders (Hayes *et al.*, 2011), with a growing body of research

increasingly supporting this parsimonious approach (Levin *et al.*, 2014; Brown & Barlow, 2009).

However, this is not to say that diagnostic approaches are not also without value. Trials comparing diagnosis-specific interventions with transdiagnostic ones are lacking. Transdiagnostic approaches need not be a replacement for diagnosis-specific interventions, and so are not required to outperform them (Clark, 2009). However, such comparisons would advance our understanding of when this approach is sufficient, and when a more specific approach is superior. Basic science findings may be more readily translated into diagnostic-specific interventions, and so allowing both approaches to complement each other is likely to be advantageous (Craske, 2012).

Clinical implications

The benefits to using a transdiagnostic group approach in clinical health settings is wide ranging. As well as improvements in psychological distress and functioning, feedback from participants has been positive, suggesting high levels of treatment acceptability. This is an important aspect of services, and a more formal qualitative exploration of participants' experiences would allow this to be investigated further.

One important consideration in setting up a transdiagnostic group is agreeing the parameters for inclusion. Too broad a range in terms of severity of psychological difficulties risks polarization of group members, which can be an unhelpful dynamic for therapy (Söchting, 2014). The range of physical conditions in a group is also likely to be an important factor for consideration. While there are many commonalities across living with different illnesses, some individual or diagnostic features are less common. For example, patients with terminal illness

are likely to face qualitatively different challenges to non-terminal chronic illness. For others, such as (HIV) and Hepatitis C, stigma is likely to be a factor in illness-associated distress (Vanable *et al.*, 2006). Introducing such aspects into a mixed group could highlight differences between participants and alter the group process.

Experience of this trial suggests that a transdiagnostic approach might not be appropriate for other reasons. In the U.K., physical conditions, such as chronic pain and oncology services, have more established group interventions available that can be tailored to be either diagnosis-specific or specific to a broad diagnostic category. As Mansell *et al.* (2009) observes, there is little that a transdiagnostic approach can offer over and above tailored protocols here. There is also a danger of focusing on the commonalities across disorders at the expense of ignoring differences between diagnoses, which could be important targets for treatment and should be considered in a transdiagnostic intervention (Craske, 2012). Future research could explore characteristics of patients or conditions that are most likely to benefit from a transdiagnostic approach.

Conclusions

We would argue that transdiagnostic group psychological interventions can play an important role in services for people living with long term physical health conditions. Further research could help identify which patients are most likely to benefit from this approach and which would be more suitable for a diagnosis-specific or broad diagnostic category intervention. This study comes at a time when there is increased interest and need to offer services to the population of people with LTC but with limited resources to allow for this extension (DoH, 2012b). Clearly these findings are highly relevant and topical.

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